

# The `clbthesis`, `clmthesis`, `clpthesis`, `clseminar`, and `cltreport` Classes\*

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\*This file has version number ? dated ?.

# 1 Introduction

The file `CLaTeX.dtx` contains everything that is needed in order to generate class files for bachelor theses, master theses, seminar reports, technical reports, and also documentation on their usage. There are three main parts. In Section 2 the usage of the provided class files is described. This is the interesting part for students that want/have to write their documents using the `cl*` classes. In Section 3 it is described how to install the provided classes. This can be done either globally (in the `$TEXMF/tex/latex/` directory; usually `/usr/share/texmf/tex/latex/`) or locally (by creating the directories `$HOME/texmf/tex/latex/` if not already present) and could therefore be interesting for both students and `TeX`nicians. In Section 4 the implementation is documented in order to enable extensions, bug fixes, etc. by other `TeX`nicians.

## 2 Usage

For all classes use `\documentclass[<language>]{<class>}` where the optional *<language>* is either `english` or `german` (`english` is the default value if the optional argument is omitted) and *<class>* is one of `clbthesis`, `clmthesis`, and `clseminar`.

### 2.1 Prelude

Several macros are provided that should be used before issuing `\maketitle` in your document. The usual `\author`, `\date`, and `\title`, as well as the newly defined macros `\institute` (only for master theses; to specify the institute where your supervisor belongs), `\mailaddress` (optional), `\matriculationnumber` (optional), `\abstract`, and `\supervisor` (`\supervisors`). Examples of their usage can be found in the respective files `clb-template.tex`, `clm-template.tex`, and `cls-template.tex`.

### 2.2 Lemmas, Theorems, and Friends

Several theorem environments are predefined for instant use. This is done via `\begin{<name>}` and `\end{<name>}` where *<name>* is one of: `corollary`, `definition`, `example`, `exercise`, `lemma`, `proof`, `proposition`, and `theorem`.

### 2.3 Bibliography

Concerning the ‘bibliography’ (`clbthesis` and `clmthesis`) and the ‘references’ (`clseminar`), the default setting is to use the file `biblio.bib` (in the current directory) for `BIBTEX`-citations (that are issued with the `\cite` command). This default setting can be changed via the command `\bibfile{<path>}` where *<path>* is the (relative or absolute) path to a `*.bib` file (without the `.bib` extension).

## 2.4 How to Generate a PDF?

That's easy. Just type

```
pdflatex <file>.tex
bibtex <file>
pdflatex <file>.tex
pdflatex <file>.tex
```

at the command line, where *<file>* is the name (without the `.tex` extension) of your main file.

## 2.5 Examples

For bachelor theses, master theses, PhD theses, seminar reports, and technical reports, use the appropriate `cl*` document classes. The files `cl*-template.tex` are examples of how one could use those classes. The main setup is done in the `cl*-template.tex` itself. It depends on three other files:

**abstract.tex** Write a short summary of your thesis/report into this file. It will occur as the ‘Abstract’.

**content.tex** Write the main content of your thesis/report into this file using `\chapter`, `\section`, etc. for theses and `\section`, `\subsection`, etc. for reports.

**appendix.tex** Write all chapters/sections that are useful but not part of the main content into this file.

## 3 Installation

In order to install the `cl*` classes. Run

```
pdflatex CLaTeX.dtx
```

to generate the file `CLaTeX.ins` (and by the way also the example files). Then run

```
latex CLaTeX.ins
```

to generate the class files. Those have to be copied to either some directory (e.g. create a directory `cl/`) in `$TEXMF/tex/latex/` or (for local installation) `$HOME/texmf/tex/latex/`. After doing so run

```
texhash
```

to make the  $\text{\TeX}$  environment aware of the new classes.

## 4 Implementation

### 4.1 Provided Class files

There are the four options `clb`, `clm`, `clp`, `cls`, and `clt` for generating the class files `clbthesis.cls` (for bachelor theses), `clmthesis.cls` (for master theses), `clpthesis.cls` (for PhD theses), `clseminar.cls` (for seminar reports), and `cltreport.cls` (for technical reports), respectively.

```
1 \NeedsTeXFormat{LaTeX2e}
2 <clb>\ProvidesClass{clbthesis}[2007/06/25 CL bachelor theses document class]
3 <clm>\ProvidesClass{clmthesis}[2007/06/25 CL master theses document class]
4 <clp>\ProvidesClass{clpthesis}[2009/04/14 CL PhD theses document class]
5 <cls>\ProvidesClass{clseminar}[2007/06/25 CL seminar report document class]
6 <clt>\ProvidesClass{cltreport}[2007/08/14 CL technical report document class]
7 <howto>\ProvidesClass{howto}[2010/01/15 Howto write for CL]
```

### 4.2 Conditionals

`\@mainmattertrue`    The conditionals `\@mainmattertrue` and `\@mainmatterfalse` are used to check whether some code is in the main part (after frontmatter and before backmatter) of a document.

```
8 \newif\if@mainmatter\@mainmattertrue
```

The default value is `\@mainmattertrue`

### 4.3 Base Class

The generated classes are based on KOMA-Script's `scrreprt`, `scrartcl` and `scrbook` classes.

```
9 <clb | clm>\LoadClass[a4paper,11pt,abstract=true,twoside]{scrreprt}
10 <clp>\LoadClass[a4paper,11pt,abstract=true,chapterprefix,twoside]{scrbook}
11 <cls | clt | howto>\LoadClass[a4paper,11pt,abstract=true,twoside]{scrartcl}
```

The default options use DIN A4 paper, 11pt font size, the title 'Abstract' for the abstract, and double page printout.

### 4.4 Dependencies

There are several packages on which the generated classes depend:

```
12 \RequirePackage{fancyhdr}
13 \RequirePackage[english,ngerman]{babel}
14 \RequirePackage{a4}
15 \RequirePackage{graphicx}
16 \RequirePackage{amsmath}
17 \RequirePackage{amssymb}
18 \RequirePackage{amsthm}
19 \RequirePackage[%
20  bookmarks,%
21  plainpages=false,%
```

```

22 pdfpagelabels,%
23 colorlinks=false,%
24 pdfborder={0 0 0},%
25 ]{hyperref}

```

## 4.5 Available Class Options

The available options are:

Option	Description	Default
english	use english names	true
german	use german names	false

```

26 \DeclareOption{english}{\AtBeginDocument{\selectlanguage{english}}}
27 \DeclareOption{german}{\AtBeginDocument{\selectlanguage{ngerman}}}
28 \ExecuteOptions{english}
29 \ProcessOptions\relax

```

## 4.6 Prepare Begin of Document

Every document starts with its frontmatter (roman page numbering is used). Additionally an english as well as a german version of `\abstractname` and `\ackname` is declared.

```

30 \AtBeginDocument{%
31   \newcommand{\degree}[1]{\renewcommand{\degreename}{#1}}
32   \global\newbox\absbox%
33   \renewcommand\abstractname{%
34     \iflanguage{english}{Abstract}{Zusammenfassung (Englisch)}%
35   }
36   \newcommand\examplename{%
37     \iflanguage{english}{Example}{Beispiel}%
38   }
39   \newcommand\exercisename{%
40     \iflanguage{english}{Exercise}{Aufgabe}%
41   }
42   \newcommand\ackname{%
43     \iflanguage{english}{Acknowledgments}{Danksagung}%
44   }
45   \definetoday
46 }

```

## 4.7 Macro Definitions

`today` In the following the macros provided by this file are described. The `\today` macro is changed according to a standard date format.

```

47 \newcommand\definetoday{%
48   \renewcommand*{\today}{%
49     \iflanguage{english}{%

```

```

50 \number\day\space \ifcase\month\or%
51   January\or%
52   February\or%
53   March\or%
54   April\or%
55   May\or%
56   June\or%
57   July\or%
58   August\or%
59   September\or%
60   October\or%
61   November\or%
62   December\or%
63 \fi\space \number\year
64 }{%
65 \number\day.\~\ifcase\month\or%
66   J\"anner\or%
67   Februar\or%
68   M\"arz\or%
69   April\or%
70   Mai\or%
71   Juni\or%
72   Juli\or%
73   August\or%
74   September\or%
75   Oktober\or%
76   November\or%
77   Dezember%
78 \fi\space \number\year
79 }%
80 }
81 }

```

Before the appendix starts, the backmatter is included. In the ToC an entry for the bibliography is created (here `\phantomsection` is used for compatibility reasons with `hyperref`).

```

82 \let\@OLDappendix\appendix
83 \renewcommand\appendix{%
84 <clb|clm|cls|clt|howto>\backmatter
85 <clb|clm|clp>\phantomsection{\addcontentsline{toc}{chapter}{\bibname}}
86 <cls|clt|howto>\phantomsection{\addcontentsline{toc}{section}{\bibname}}
87 \bibliographystyle{abbrv}
88 \bibliography{\@bibfile}
89 \@OLDappendix
90 }

```

#### 4.7.1 Theorem Environments

corollary	Some standard environments are set up for use.
definition	
example	
exercise	
lemma	
proposition	
theorem	

```

91 \theoremstyle{plain}
92 \newtheorem{corollary}{Corollary}[%
93 <clb | clm | clp>chapter%
94 <cls | clt | howto>section%
95 ]
96 \newtheorem{lemma}[corollary]{Lemma}
97 \newtheorem{proposition}[corollary]{Proposition}
98 \newtheorem{theorem}[corollary]{Theorem}
99
100 \theoremstyle{definition}
101 \newtheorem{definition}[corollary]{Definition}
102 \newtheorem{example}[corollary]{\examplename}
103 \newtheorem{exercise}[corollary]{\exercisename}

```

#### 4.7.2 Bibliography

`\@bibfile` The file `\@bibfile` (without extension `.bib`) is searched for bibliography entries. The default setting is `biblio` (hence `biblio.bib` in the current directory is used).

```

104 \newcommand\@bibfile{biblio}

```

`\bibfile` The bibfile name can be set with `\bibfile`.

```

105 \newcommand\bibfile[1]{\renewcommand\@bibfile{#1}}

```

#### 4.7.3 Miscellany

`\plaintitle` For `clmthesis` and `clpthesis` the commands `\plaintitle` and `\plainauthor` have to be used in order to set the contents of the first page correctly. Since `\title` and `\author` may contain `\footnotes` and `\thankss`, those can not be used here.

```

106 <*clm | clp>
107 \newcommand*\@supervisor{insert the name of your supervisor}
108 \global\let\@supervisors\@empty
109 \newcommand*\@institute{insert the institute of your supervisor}
110 \newcommand*\institute[1]{\gdef\@institute{#1}}
111 </clm | clp>
112 \newcommand*\@mailaddress\@empty
113 \global\let\@matriculationnumber\@empty
114 \newcommand*\mailaddress[1]{\gdef\@mailaddress{#1}}
115 \newcommand*\matriculationnumber[1]{\gdef\@matriculationnumber{#1}}
116 \newcommand*\@plaintitle\@empty
117 \newcommand*\@plainauthor\@empty
118 \newcommand*\plaintitle[1]{\gdef\@plaintitle{#1}}
119 \newcommand*\plainauthor[1]{\gdef\@plainauthor{#1}}

```

`\kindname` The kind of document for bachelor, master, and doctoral theses, as well as seminar reports is defined in English and German.

```

120 <*clb>
121 \newcommand\kindname{%
122 \iflanguage{english}{Bachelor~Thesis}{Bachelorarbeit}%

```

```

123 }
124 </clb>
125 <*clm>
126 \newcommand\kindname{%
127 \iflanguage{english}{Master~Thesis}{Masterarbeit}%
128 }
129 </clm>
130 <*clp>
131 \newcommand\kindname{%
132 \iflanguage{english}{dissertation}{Doktorarbeit}%
133 }
134 </clp>
135 <*cls>
136 \newcommand\kindname{%
137 \iflanguage{english}{Seminar~Report}{Seminararbeit}%
138 }
139 </cls>
140 <*howto>
141 \newcommand\kindname{%
142 \iflanguage{english}{}{}%
143 }
144 \@ifundefined{BibTeX}
145 {\def\BibTeX{{\rmfamily B\kern-.05em%
146 \textsc{i\kern-.025em b}\kern-.08em%
147 T\kern-.1667em\lower.7ex\hbox{E}\kern-.125emX}}}{}}
148 </howto>
149 <*clt>
150 \newcommand\kindname{%
151 \iflanguage{english}{Technical~Report}{Technischer~Bericht}%
152 }
153 </clt>

\supervisorname The word ‘supervisor’ in English and German.
154 \newcommand\supervisorname{%
155 \iflanguage{english}{Supervisor}{Betreuer}%
156 }

\supervisorsname The word ‘supervisors’ in English and German.
157 \newcommand\supervisorsname{%
158 \iflanguage{english}{Supervisors}{Betreuer}%
159 }

\degree The degree printed at the first page of a master thesis is specified by
\degree which has as default value ‘Master of Science’.
160 \newcommand\degree{Master of Science}

\subject \subject and \publishers are commands from the KOMA-Script packages.
\publishers 161 \subject{\kindname}
162 \newcommand{\supervisor}[1]{%
163 \def\@supervisor{#1}
164 \publishers{\textbf{\supervisorname:} #1}

```



```

165 }
166 \newcommand{\supervisors}[1]{%
167   \def\@supervisors{#1}
168   \publishers{\textbf{\supervisorsname:}}
169   {
170     \def\and{\&}
171     \begin{tabular}[t]{l}
172       #1
173     \end{tabular}
174   }
175 }
176 }

```

#### 4.7.4 Document Structure

`\abstract` The abstract is a short summary of the contents of the document, whereas in the  
`\acknowledgments` acknowledgment, thanks goes to people that have been especially helpfull in writing the document.

```

177 <*clb | clm | cls | clt | howto>
178 \renewcommand\abstract[1]{%
179   \global\setbox\absbox=\hbox{#1}%
180 }
181 </clb | clm | cls | clt | howto>
182 <*clp>
183 \newcommand\abstract[1]{%
184   \global\setbox\absbox=\hbox{#1}%
185 }
186 </clp>
187 \global\let\@acknowledgments\@empty
188 \newcommand\acknowledgments[1]{\def\@acknowledgments{#1}}

```

`\frontmatter` A document is separated into frontmatter, mainmatter, and backmatter.

```

\mainmatter 189 <*clb | clm>
\backmatter 190 \newcommand*\frontmatter{%
191   \if@twoside\cleardoublepage\else\clearpage\fi
192   \@mainmatterfalse\pagenumbering{roman}%
193 }
194 \newcommand*\mainmatter{%
195   \if@twoside\cleardoublepage\else\clearpage\fi
196   \@mainmattertrue\pagenumbering{arabic}%
197 }
198 </clb | clm>
199 <*cls | howto>
200 \newcommand*\frontmatter{%
201   \clearpage
202   \@mainmatterfalse\pagenumbering{roman}%
203 }
204 \newcommand*\mainmatter{%
205   \clearpage
206   \@mainmattertrue\pagenumbering{arabic}%

```

```

207 }
208 </cls | howto>
209 <clb | clm | cls | clt | howto>\newcommand*\backmatter{%
210 <clp>\renewcommand*\backmatter{%
211 <clb | clm | clp>\if@openright\cleardoublepage\else\clearpage\fi
212 <cls | clt>\clearpage
213 \@mainmatterfalse%
214 }

```

#### 4.7.5 Titlepage

`\maketitle` Part of the titlepage are the logos of the University of Innsbruck and of the computational logic group.

```

215 \renewcommand*\maketitle[1][-1]{%
216 <*clm>
217 \setcounter{page}{#1}
218 \pagestyle{empty}
219 \begin{center}
220 {\huge\textbf{\@plaintitle}}
221 \vskip3em
222 {\Large\textbf{%
223 \iflanguage{english}{%
224 master thesis in computer science
225 }{%
226 Masterarbeit in der Studienrichtung Informatik
227 }
228 }}
229 \vskip3em
230 {\Large \iflanguage{english}{by}{von}}
231 \vskip3em
232 {\LARGE\textbf{\@plainauthor}}\par
233 \vskip3em
234 {\Large\vbbox{%
235 \iflanguage{english}{
236 submitted to the Faculty of Mathematics, Computer \\\
237 Science and Physics of the University of Innsbruck
238 \vskip2em
239 in partial fulfillment of the requirements \\\
240 for the degree of \degree
241 }{
242 eingereicht an der \\\
243 Fakult\"at f\"ur Mathematik, Informatik und Physik \\\
244 der Universit\"at Innsbruck
245 \vskip2em
246 zur Erlangung des akademischen Grades \\\
247 \degree
248 }
249 }}\par
250 \vfill

```

```

251 {\Large
252 \vbox{
253 \ifx\@supervisors\@empty
254 \iflanguage{english}{%
255 \expandafter\lowercase\expandafter{\supervisorname}%
256 }{\supervisorname}%
257 : \@supervisor, \mbox{\@institute}
258 \else
259 \iflanguage{english}{%
260 \expandafter\lowercase\expandafter{\supervisorsname}%
261 }{\supervisorsname}%
262 :
263 {
264 \def\and{, }
265 \@supervisors
266 \\
267 \mbox{\@institute}
268 }
269 \fi
270 }}\par
271 \vfill
272 {\Large\textbf{Innsbruck, \@date}}
273 \end{center}
274 </clm>
275 <*clp>
276 \renewcommand\supervisorsname{advisors}
277 \renewcommand\supervisorname{advisor}
278 \setcounter{page}{#1}
279 \pagestyle{empty}
280 \begin{center}
281 {\huge\textbf{\@plaintitle}}
282 \vskip3em
283 {\Large\textbf{%
284 \iflanguage{english}{%
285 dissertation
286 }{%
287 Doktorarbeit in der Studienrichtung Informatik
288 }
289 }}
290 \vskip3em
291 {\Large \iflanguage{english}{by}{von}}
292 \vskip3em
293 {\LARGE\textbf{\@plainauthor}}\par
294 \vskip3em
295 {\Large\vbox{%
296 \iflanguage{english}{
297 submitted to the Faculty of Mathematics, Computer \\\
298 Science and Physics of the University of Innsbruck
299 \vskip2em
300 in partial fulfillment of the requirements \\\

```

```

301   for the degree of \degreename
302 }{
303   eingereicht an der \\
304   Fakult\"at f\"ur Mathematik, Informatik und Physik \\
305   der Universit\"at Innsbruck
306   \vskip2em
307   zur Erlangung des akademischen Grades \\
308   \degreename
309 }
310 }}\par
311 \vfill
312 {\Large
313   \vbox{
314     \ifx\@supervisors\@empty
315       \iflanguage{english}{%
316         \expandafter\lowercase\expandafter{\supervisorname}%
317       }\supervisorname}%
318     : \@supervisor
319   \else
320     \iflanguage{english}{%
321       \expandafter\lowercase\expandafter{\supervisorsname}%
322     }\supervisorsname}%
323   :
324   {
325     \def\and{, }
326     \@supervisors
327   }
328 \fi
329 }}\par
330 \vfill
331 {\Large\textbf{Innsbruck, \@date}}
332 \end{center}
333 </clp>
334 \frontmatter
335 \thispagestyle{empty}
336 \let\footnotesize\small
337 \let\footnoterule\relax
338 \let\footnote\thanks
339 \renewcommand*\thefootnote{\@fnsymbol\c@footnote}%
340 \let\@oldmakefnmark\@makefnmark
341 \renewcommand*{\@makefnmark}{\rlap{\@oldmakefnmark}}
342 \newbox\cllbox
343 \newbox\ifibox
344 \newbox\unibox
345 \newdimen\logoheight
346 \setbox\cllbox=\hbox{\includegraphics[scale=0.36]{clshortlogo_new.pdf}}
347 \setbox\ifibox=\hbox{\includegraphics[scale=0.38]{ifilogo.pdf}}
348 \setbox\unibox=\hbox{\includegraphics[scale=0.2]{unilogo.png}}
349 \logoheight=\ht\cllbox
350 \begin{center}

```

```

351 \hbox to \textwidth{%
352   \rlap{\box\cllbox}
353   \hfill
354   \hbox{\vbox to \logoheight{\box\ifibox \vfill}}
355   \hfill
356   \llap{\box\unibox}
357 }
358 \ifx\@subject\@empty \else
359   {\bigskip\Large \@subject \par}
360   \vskip 3em
361 \fi
362 {\titlefont\huge \@title\par}
363 \vskip 3em
364 {\Large \lineskip 0.75em
365 \begin{tabular}[t]{c}
366   \@author{}
367   \ifx\@matriculationnumber\@empty{}\else(\@matriculationnumber)\fi \\
368   \href{mailto:\@mailaddress}{\texttt{\@mailaddress}}
369 \end{tabular}\par}
370 \vskip 1.5em
371 {\Large \@date \par}
372 \vskip \z@ \@plus3fill
373 {\Large \@publishers \par}
374 \vskip 3em
375 <*cls | clt | howto>
376 \null\vfill
377 \@beginparpenalty\@lowpenalty
378 \normalfont\sectfont\nobreak\abstractname
379 \@endparpenalty\@M
380 </cls | clt | howto>
381 \end{center}\par
382 \@thanks
383 \global\let\@thanks\@empty
384 \vfill\null
385 <*cls | clt | howto>
386 \unhbox\absbox
387 \par%\vfil\null
388 </cls | clt | howto>
389 \vskip 3em
390 \@thanks
391 %\vfill\null
392 \setcounter{footnote}{0}%
393 \global\let\thanks\relax
394 \global\let\maketitle\relax
395 \global\let\@thanks\@empty
396 \global\let\@author\@empty
397 \global\let\@date\@empty
398 \global\let\@title\@empty
399 \global\let\@extratitle\@empty
400 \global\let\@titlehead\@empty

```

```

401 \global\let\@subject\@empty
402 \global\let\@publishers\@empty
403 \global\let\@uppertitleback\@empty
404 \global\let\@lowertitleback\@empty
405 \global\let\@dedication\@empty
406 \global\let\author\relax
407 \global\let\title\relax
408 \global\let\extratitle\relax
409 \global\let\titlehead\relax
410 \global\let\subject\relax
411 \global\let\publishers\relax
412 \global\let\uppertitleback\relax
413 \global\let\lowertitleback\relax
414 \global\let\dedication\relax
415 \global\let\date\relax
416 \global\let\and\relax
417 \clearpage
418 <*clb | clm | clp>
419 \cleardoublepage
420 \chapter*{Eidesstattliche Erkl{"a}rung}
421 \thispagestyle{empty}
422
423 Ich erkl{"a}re hiermit an Eides statt durch meine eigenh{"a}ndige Unterschrift,
424 dass ich die vorliegende Arbeit selbst{"a}ndig verfasst und keine anderen
425 als die ange\~gebenen Quellen und Hilfsmittel verwendet habe. Alle Stellen,
426 die w{"o}rtlich oder inhaltlich den angegebenen Quellen entnommen wurden,
427 sind als solche kenntlich gemacht.
428
429 \noindent
430 <*clb>
431 Ich erkl{"a}re mich mit der Archivierung der vorliegenden
432 \foreignlanguage{german}{\kindname}
433 einverstanden.
434 </clb>
435 <*clm | clp>
436 Die vorliegende Arbeit wurde bisher in gleicher oder {"a}hnlicher Form noch
437 nicht als Magister-/Master-/Diplomarbeit/Dissertation eingereicht.
438 </clm | clp>
439
440 \vspace{2cm}
441
442 \noindent\mbox{}
443 \hskip 0pt plus .25fill
444 \hrulefill
445 \hskip 0pt plus .5fill
446 \hrulefill
447 \hskip 0pt plus .25fill
448 \mbox{}
449 \\
450 \noindent\mbox{}

```

```

451 \hskip 0pt plus .25fill
452 Datum
453 \hskip 0pt plus .5fill
454 Unterschrift
455 \hskip 0pt plus .25fill
456 \mbox{}
457 \cleardoublepage
458 </clb | clm | clp>
459 }}

```

#### 4.7.6 Table of Contents

`\tableofcontents` Immediately after the ToC the mainmatter starts and also headings are printed.

```

460 \let\@OLDtableofcontents\tableofcontents
461 \renewcommand\tableofcontents{%
462 <*cls | clt | howto>
463 \pagestyle{plain}
464 </cls | clt | howto>
465 <*clb | clm | clp>
466 \pagestyle{empty}
467 \cleardoublepage
468 \begin{center}
469 \normalfont\sectfont\nobreak\abstractname
470 \@endparpenalty\@M
471 \end{center}
472 \unhbox\absbox
473 \par\vfil\null
474 \ifx\@acknowledgments\@empty{}\else
475 \cleardoublepage
476 \chapter*{\ackname}
477 \@acknowledgments
478 \cleardoublepage
479 \fi
480 </clb | clm | clp>
481 \@OLDtableofcontents
482 <clb | clm | clp>\cleardoublepage
483 <cls | clt | howto>\newpage
484 \mainmatter
485 <*clb | clm | clp | cls | clt>
486 \pagestyle{fancy}
487 \fancyhead{}
488 \fancyfoot{}
489 </clb | clm | clp | cls | clt>
490 <*clb | clm | clp>
491 \renewcommand\chaptermark[1]{\markboth{\thechapter\ ##1}{}}
492 \renewcommand\sectionmark[1]{\markright{\thesection\ ##1}}
493 \renewcommand\headrulewidth{0.5pt}
494 </clb | clm | clp>
495 <*cls | clt | howto>

```

```

496 \renewcommand\sectionmark[1]{\markboth{\thesection\ ##1}{}}
497 \renewcommand\subsectionmark[1]{\markright{\thesubsection\ ##1}}
498 \renewcommand\headrulewidth{0pt}
499 </cls | clt | howto>
500 <*clb | clm | clp | cls | clt>
501 \fancyhead[LE]{\leftmark}
502 \fancyhead[RO]{\rightmark}
503 \fancyfoot[LE,RO]{\thepage}
504 </clb | clm | clp | cls | clt>
505 }

```

## 4.8 The End

```

506 \endinput

```